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Business model innovation to network collaboration and knowledge management practices in Thailand's pharmaceutical industry entrepreneur

Chayanan Kerdpitak[a], Pattama Suriyakul Na Ayudhya[b,*], Thitawan Insaad[b], Kai Heuer[c]

[a] *Collage of Innovation and Management, Suan Sunandha Rajabhat University, Bangkok 10300, Thailand*
[b] *Faculty of Liberal Arts and Management Science, Kasetsart University, Bangkok 10900, Thailand*
[c] *Wismar Business School, Wismar University of Applied Sciences, Wismar 23966, Germany*

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Abstract

In a modern business environment, rapid development of network collaboration, knowledge practices, and technological capabilities are significant sources for the business model innovation (BMI). This study investigates the crucial impact of internal and external knowledge management capabilities and network collaboration on the BMI in pharmaceutical sector in Thailand. This study also evaluates the moderating impact of organizational risk-taking tolerance on BMI and suggests an alternative effective BMI. Population from 1,870 pharmaceutical firms in Thailand were empirically evaluated using confirmatory factor analysis, Structured Equation Modeling (SEM), and comparative analysis. The data were collected from 860 entrepreneurs from these 1,870 pharmaceutical firms. The sample size was determined based on the criterion of 20 times the observed variables. The outcomes from the SEM technique manifested that particularly internal knowledge management capabilities did not stimulate the model of business innovation of the pharmaceutical sector of Thailand. Furthermore, SEM results showed that external knowledge management capabilities can enhance the BMI of pharmaceutical firms, and network collaboration strengthens the BMI mainly with high organizational risk-taking tolerance.

Introduction

A business model is a systematic solution to handle a problem (Al-Khatib, 2018). All successful organizations rely on their business models to effectively utilize their resources, capabilities and strategies to achieve their goals with the help of technology when managing their operating system, and planning business strategies (Kasemsap, 2016). In Thailand, currently, digital enforcement has been widely adopted by many companies to upgrade their performance in entrepreneurial activities. No doubt there are some risk factors involved in the innovation process of the business model (Yan & Guan, 2018). On an international level, the majority of multinational companies, either product

* Corresponding author.
E-mail address: pattama.s@ku.ac.th (P. Suriyakul Na Ayudhya).

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or service-oriented, emphasize more on enhancing their knowledge management practices and network collaboration during their planning, developing and related important decision-making phases (Luu, 2017).

According to entrepreneurs, such critical analysis regarding an innovative modeling process can enhance the productivity of an organization (Elamir, 2017). There are three major approaches to adopt a business model innovation in the operating activities of an organization like reinventors, adventures, adapters and mavericks (Chow, 2016). Most of the time, the percentage of the risk factor is based on the expending motivation of entrepreneurs. In Thailand, the majority of pharmaceutical companies are majorly focused on adjusting their business model with the changing technological environment. This is a reason that their profit margin has helped boost the economy of Thailand. The performance efficiency of Thailand pharmaceutical companies outperformed other industries, and their performance level is continuously developing (Yong et al., 2020). The top ten pharma companies in Thailand and their details are listed in Table 1 below.

According to Table 1, pharmaceutical companies in Thailand generated a large profit margin, and their management through business models fulfilled the needs of all the related stakeholders (Castellacci et al., 2018). Since 2017, pharmaceutical business has contributed 16 to 17 percent of the GDP in the Thailand economy (Baker et al., 2017). Pfizer is a good example for being an innovation-based pharmaceutical company that has done well in business.

Literature Review

Internal Knowledge Management Capabilities and Business Model Innovation

An innovation oriented business model is a basic need of an organization to be able to compete with other organizations and keep all stakeholders satisfied. To elaborate this point of view, (Ferraris et al., 2017) evaluated the role of internal knowledge management like culture, structure and technology to upgrade the performance level of an organization.

Similar studies were conducted in 2016 and 2017. According to the studies, such management capabilities helped make an innovative service to the employees, customers, suppliers and other related stakeholders (Malkawi & Rumman, 2016; Santoro et al., 2018). The result showed that a positive culture, technology adoption and structure played a major role in upgrading the productivity of any organization. Hence, the first hypothesis of this study is;

H_1: There is a significant direct relationship between Internal Knowledge Management Capabilities and Business Model Innovation

Moderating role of Organizational Risk Taking Tolerance between Internal Knowledge Capabilities and Business Model Innovation

A study by (Cai et al., 2016) critically evaluated the moderating role of the information technology capability in the effective relationship between the organizational responsiveness and the network collaboration factor in operating activities of an organization in China. Another constructive study was conducted by (Hock-Doepgen et al., 2020) to justify that the operational risk factor played a major role in enhancing the organizational management to make an attractive business process within an organization while (Weimann et al., 2019) stated that most family firms were dynamic in their capability and strategically overcome the risk factor in their future projects, so this study proposes the second hypothesis below.

H_2: Organizational Risk Taking Tolerance plays a significant moderating role between Internal Knowledge Capabilities and Business Model Innovation

Table 1 Top ten pharma companies in Thailand

Rank	Company	Revenue (USD million)	Market share (%)	Growth since 2017
1	Pfizer	288	5.2	5
2	GSK	261	4.8	1
3	MSD	246	4.5	2
4	Novartis	222	4.1	1
5	Roche	201	3.7	-4
6	Siam Bioscience	169	3.1	12
7	Sanofi Aventis	164	3.0	-5
8	Berline	149	2.7	16
9	Takeda	140	2.8	15
10	Sandoz	125	2.3	6

Network Collaboration and Business Model Innovation

According to Florian and Henning in 2017, a business model of an organization is directly correlated with the efficient network collaboration factor (Breuer & Lüdeke-Freund, 2017). This is a constructive approach in front of management to make some productive strategies for organizational productivity. This approach helps resolve the management problems and creates a better and more effective network between the organization and the stakeholders. It also uplifts the confidence level of an organization in the customer market (Velu, 2016). Hence, the third hypothesis of this study is as follows.

H_3: There is a significant direct relationship between Network Collaboration and Business Model Innovation

Moderating role of Organizational Risk Taking Tolerance between Network Collaboration and Business Model Innovation

Research was conducted by several researchers whereby they assessed the influential power of organizational risk acceptance factors in enhancing improved communication channels in the development of innovative business models to organizational risk taking tolerance (Roldán Bravo et al., 2017). The study illustrated that IT played a major role in business strategically approach planning. In 2018, a group of creative researchers conducted additional studies, where researchers detail the approach of profitable entrepreneurs in developing advanced business model development (Ebrahimi et al., 2018). So, a further proposed hypothesis of this study is;

H_4: Organizational Risk Taking Tolerance plays a significant moderating role between Network Collaboration and Business Model Innovation

External Knowledge Management Capabilities and Business Model Innovation

Various studies were conducted to evaluate the importance of an external open innovation-based knowledge management capabilities factor, and its impacts on the durability of an organization in a highly competitive market context. According to the research articles, structural equation modeling plays an important role to make a knowledge oriented leadership (Martinez-Conesa et al., 2017). It further helps an organization to make a profitable future (Hossain, 2017; Naqshbandi & Jasimuddin, 2018). Mokter Hossain also justified this point by elaborating the business model innovation factor in the past, present and future based development projects. This was a constructive approach to upgrade the business innovation model by a productive knowledge management based conversion process, application process and acquisition process (Foss & Saebi, 2017). Such processes developed pressure on upgrading the business model in the operating activities of an organization Thus, the fifth hypothesis is proposed below.

H_5: There is a significant direct relationship between External Knowledge Management Capabilities and Business Model Innovation

Moderating role of Organizational Risk Taking Tolerance between External Knowledge Management Capabilities and Business Model Innovation

Many studies have been conducted to critically evaluate the moderating role of the risk tolerance factor among the stakeholders of an organization. Many studies concluded that the majority of the shareholders were risk-averse, so it was quite difficult in front of the management to reduce their perception level regarding loss related threats. Previous studies stated that the majority of the entrepreneurs reduced the risk tolerance factor to enhance their profitability ratio in the market (García-Piqueres et al., 2019). Sometimes, customer perception and knowledge related factors enhanced the competition level in the industry and in such cases, team skills and their challenge-facing skills made them safe and risk-free (Haider, 2019). Hence, the sixth hypothesis of this study is;

H6: Organizational Risk Taking Tolerance plays a significant moderating role between External Knowledge Management Capabilities and Business Model Innovation

Theoretical Framework

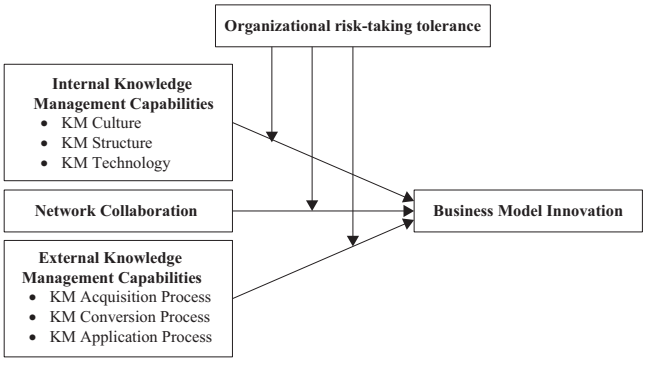

Figure 1 Conceptual Framework

Methodology

Measurements

Multi-item scales from different studies were adopted to evaluate the proposed model. All items were rated using a five-point Likert scale. Business model innovation was evaluated by 8 items adapted from a scale developed by Ebrahimi et al., 2018 to what firm have accomplished in previous years. Results showed that the composite reliability value was α= 0.884. For measuring knowledge management technology (KMT) of a firm, the three items scale from Gold et al. (2001) was selected. Three items were modified to check the knowledge management technology of the firms that allow "search for new knowledge and to retrieve and use knowledge about its products and processes". Responses from the five-point Likert scale showed the value at α= 0.878. Knowledge management structure and knowledge management culture were also measured by using 8 items from (Gold et al., 2001). Respondents rated the structural support and firms' culture on a 5 point Likert scale, and the results were α= 0.873 and α= 0.883 respectively. External knowledge management capabilities such as knowledge management acquisition process, knowledge management conversion process and knowledge management application process were evaluated by adapting 16 items from Gold's et al. (2001) scale to analyze knowledge management of a firm. Multiple items were used to measure a firm's knowledge managements in terms of acquisition, conversion, and application of knowledge. High reliability was illustrated in three variables; α= 0.889 for knowledge management acquisition process, α= 0.944 for knowledge management conversion, and α= 0.921 for knowledge management application process. Additionally, organizational risk tolerance was measured using the four items from Herzog and Leker (2010). Employees were asked to rate the level of risk tolerance on a 5 Point-Likert scale, and the Cronbach Alpha value was 0.901, which showed good reliability.

Data Collection

Based on the purposive sample, the sample size used in this survey was 860 (n = 860) entrepreneurs from 1,870 pharmaceutical firms in Thailand. The unit of analysis was the pharmaceutical organization. We selected the pharmaceutical sector because it was the second-largest pharmaceutical market in South-Asia. It was expected to double in growth in the upcoming years. These firms faced constant technological developments and changes that encouraged them to innovate. The sample size was determined based on the criterion of 20 times the observed variables. Data were collected with the use of a questionnaire and analyzed with a structural equation modeling. The use of structural equation modeling is most popular in the social sciences. Finally, the current study used stratified sampling to distribute the questionnaires among the pharmaceutical firms. For data collection, a survey method was initiated. A questionnaire was distributed to entrepreneurs who worked in 1,870 pharmaceutical firms. This was to ensure validity and reliability of the data.

Data Analysis

Variables were investigated by CFA and descriptive statistic (Hameed et al, 2018; Iqbal & Hameed, 2020). These tests were operated on AMOS and SPSS. AMOS and SPSS were used as they were able to draw graphical models using simple drawing tools, quickly performed the valuation for different analysis and displayed the results.

Results

To investigate the proposed hypotheses, a total of 860 (n = 860) entrepreneurs from 1,870 pharmaceutical firms in Thailand were selected as samples. Statistical analysis showed that 582 entrepreneurs were male, and 278 were female, 12.3 percent were less than 25 years of age. 29.1 percent of the respondents were 25–35 years old. 54.5 percent of them were between 35–45 years old and 4.1 percent were more than 45 years old. After running various statistical tests, results were as summarized in following tables.

Table 2 provides the descriptive results of four variables in the study. N was 368 observations. Minimum and maximum statistic values ranging from 1 and 5 show no variable is an outlier in the data, which means there is no significant difference between observations. Mean values of external knowledge management capabilities and business model innovation were leaning towards 4 indicating that most respondents agreed with the statements acquired in the questionnaire. Mean values of the internal knowledge management capabilities, network collaboration and organizational risk inclined to 3.3, which showed that most respondents had neutral responses. The skewness measures the test normality of the data. Data from Table 2 indicated the skewness was between -1 and +1, so the data had normal distribution against all variables.

Table 3 presents results of the KMO and Bartlett's Test to check suitability and adequacy of the sample. The results showed Kaiser-Meyer-Olkin Measure of Sampling Adequacy as .971, almost 1, which meant the sample was adequate. Bartlett's Test of Sphericity value was 35744.336, which was significant.

Table 2 Descriptive Statistics

Variables	*N*	Min	Max	Mean	*SD*	Skewness	*SE*	Kurtosis	*SE*
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic		Statistic	
InterKMC	368	1.00	5.00	3.2376	1.04614	-.174	.127	-.779	.254
NetwCol	368	1.00	5.00	3.3370	0.98428	-.385	.127	-.592	.254
ExterKMC	368	1.00	5.00	3.5781	1.18379	-.626	.127	-.739	.254
OrgRisT	368	1.00	5.00	3.4524	1.14205	-.513	.127	-.563	.254
BusModlInn	368	1.00	5.00	3.5411	1.07651	-.601	.127	-.528	.254
Valid N (listwise)	368								

Table 3 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.971
Bartlett's Test of Sphericity	Approx. Chi-Square	35744.336
	df	903
	p	.000

In addition, Table 4 includes results of rotated component matrix with factor loading of 43 items. Each construct items factor loading was greater than 0.7. Evidence external knowledge capabilities was EK16 (0.93) to EK1 (0.89), which was in the range of 0.8 to 0.9, approaching 1. Therefore, it validated that there was no cross loading error and content was highly valid. In Table 5, convergent and discriminant validity showed the composite reliability (CR) and the average variance extracted (AVE) of each variable. The statistics showed that business model innovation had the highest composite reliability (0.957), which meant that scale items were internally consistent. Network collaboration had the lowest composite reliability (0.857) and the lowest AVE (0.700). As CR and AVE values of constructs were between 0.5 and 0.7, data were convergently valid. Table 5 also shows the result of discriminant validity. The bold values in the diagonal portion of the table were 0.893 for internal knoweldge managemnet capabilties, 0.894 for organization risk tolernace, 0.843 for business model innovation, 0.969 for external knowledge managemnet capabilties and 0.837 for network collabartion. These showed that each variable was distinctive from other variables.

Table 6 indicates the model fitness. The s threshold value for CMIN/DF (discrepancy function) was ≤ 3, GFI (goodness of fit index) was ≥ 0.80, CFI (comparative fit index) and IFI (incremental fit index) was ≥ .90, and RMSEA was ≤ .80. The observed values for all these indicators were CMIN/DF = 2.168, GFI =0.810, IFI= 0.944, CFI= 0.943 and RMSEA= 0.075, which verified that the model was a good fit.

Table 4 Rotated Component Matrix

Variables	Component				
	1	2	3	4	5
IK1		.762			
IK2		.778			
IK3		.728			
IK4		.730			
IK5		.939			
IK6		.938			
IK7		.939			
IK8		.938			
IK9		.932			
IK10		.938			
IK11		.939			
NC1					.753
NC2					.756
NC3					.762
EK1	.897				
EK2	.880				
EK3	.815				
EK4	.864				
EK5	.931				
EK6	.935				
EK7	.925				
EK8	.929				
EK9	.919				
EK10	.917				
EK11	.918				
EK12	.927				
EK13	.937				
EK14	.934				
EK15	.929				
EK16	.933				
RT1				.792	
RT2				.786	
RT3				.770	
RT4				.786	
BM1			.705		
BM2			.756		
BM3			.807		
BM4			.785		
BM5			.791		
BM6			.870		
BM7			.858		
BM8			.814		
BM9			.837		

Table 5 Convergent and Discriminant Validity

Variables	CR	AVE	MSV	MaxR(H)	IK	RT	BM	EK	NC
IK	0.917	0.797	0.297	0.999	0.893				
RT	0.941	0.799	0.361	0.999	0.499	0.894			
BM	0.957	0.710	0.283	0.999	0.386	0.483	0.843		
EK	0.930	0.939	0.361	1.000	0.454	0.601	0.507	0.969	
NC	0.875	0.700	0.315	1.000	0.545	0.561	0.532	0.499	0.837

Table 6 Model Fit Indices

Model Fit Indicators	CMIN/DF	GFI	IFI	TLI	CFI	RMSEA
Threshold Value	≤ 3	≥ 0.80	≥ 0.90	≥ 0.90	≥ 0.90	≤ 0.08
Observed Value	2.168	0.810	0.973	0.971	0.973	0.056

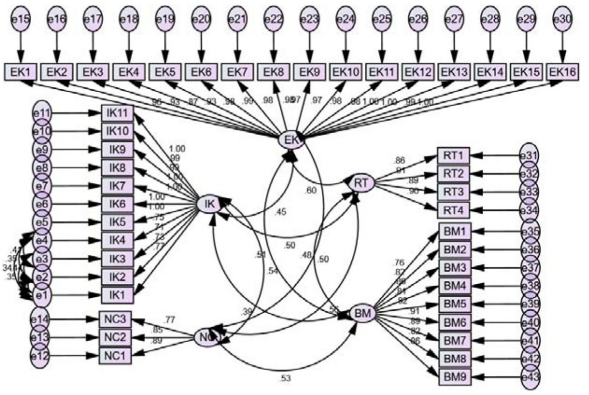

Figure 2 CFA

Table 7 explains the results of hypothesis obtained through operating structural equation modeling. It showed that a one-unit increase in internal knowledge management capability led to an increase of 12.1 percent in business model innovation. This showed significant regression effect, therefore, this hypothesis was accepted. Moreover**,** business model innovation and network collaboration indicated a significant relationship unitary increase in network collaboration will enhance business innovation model by 32.1 percent. Business model innovation had negative and insignificant relationship with external KMC as unitary increase in external knowledge management capabilities will increase business model innovation 28.5 percent. Indirect effect through moderators is found significant and positive except network collaboration. Risk tolerance and business model innovation, which had *p*-value .64, is insignificant and consequently is rejected.

Discussion

Network collaboration and knowledge management promoted a significant business model and suggestions for improving the process of innovation in any sector (Kianto et al., 2017). Implementing knowledge management and network collaboration in the pharmaceutical industry in Thailand led directly to the performance in terms of innovation. Results from the study portrayed the insignificant impact of internal knowledge management capabilities on the business model innovation because internal KMC generated confusion among managers and workers. This explained the reason the hypothesis was rejected because it developed negative effects in the innovational business model. The second results of the study portrayed that the impact of network collaboration and external KMC had significant and positive impact over the innovational business model of the pharmaceutical industry of Thailand. According to a study by Liao et al. (2017), a system and firm with network collaboration facilities could generate an effective environment of innovation with greater efficiency and provide access to additional resources. Therefore, the second and third hypotheses of the study were accepted.

Table 7 Structural Equation Modeling

Regression Effect			Estimate	*SE*	C.R.	*p*
BusModlInn	<---	InterKMC	.121	.053	2.271	.023
BusModlInn	<---	NetwCol	.321	.056	5.681	***
BusModlInn	<---	ExterKMC	.285	.045	6.323	***
Moderation Effect			**Estimate**	**S.E.**	**C.R.**	***p***
ZBusModlInn	<---	ZInterKMC	.046	.038	1.217	.224
ZBusModlInn	<---	IKMCxRK_Int1	.101	.037	2.701	.007
ZBusModlInn	<---	ZOrgRisT	.449	.051	8.840	***
ZBusModlInn	<---	ZNetwCol	.168	.040	4.162	***
ZBusModlInn	<---	NCxRK_Int2	-.016	.034	-0.465	.642
ZBusModlInn	<---	ZExterKMC	.190	.042	4.562	***
ZBusModlInn	<---	EKMCxRK_Int3	.080	.034	2.310	.021

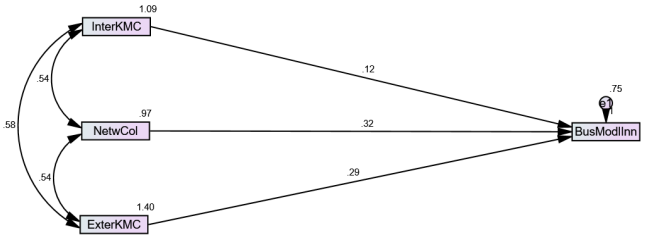

Figure 3 Conceptual Model of Business Model Innovation

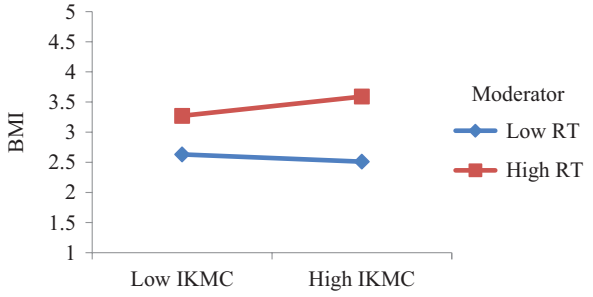

Figure 4 Moderating Effect of RT Between IKMC and BMI

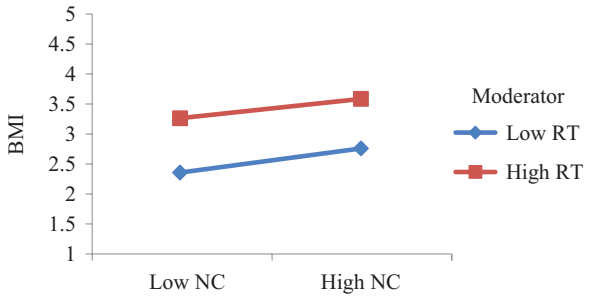

Figure 5 Moderating Effect of RT Between NC and BMI

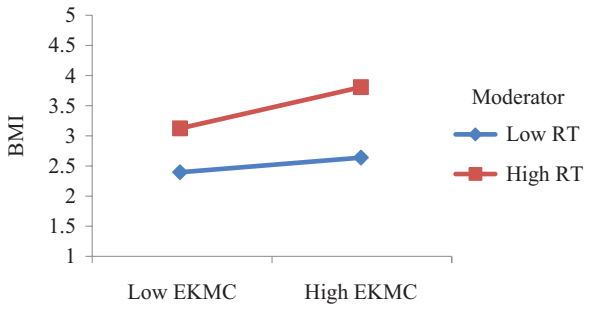

Figure 6 Moderating Effect of RT Between EKMC and BMI

Results from the study also showed that the moderating impact of risk-taking tolerance had no significant impact on the relationship between internal KMC and business innovation model. This was because a high degree of organizational RTT can have a negative impact on long term growth of the firm. Therefore, the hypothesis was rejected.

Conclusion and Recommendation

The main objective of this research paper was to identify the impact of knowledge management and network collaboration practices on the pharmaceutical industry in Thailand within the moderating role of organizational risk-taking tolerance. Data were gathered from 368 employees, 202 males and 166 females, who worked for 70 pharmaceutical firms in Thailand. KMO and confirmatory analysis were used when analyzing the data.

The given study benefits the pharmaceutical field in building a better organizational culture to promote the better performance of the drug makers. The study includes innovative ideas and strategies that help a lot in improving performance at the managerial level but also the customer relations and the service quality too. The findings related to capital management provide significant materials for those organizations that practice the concept.

Implications and Limitations

The results of this study will be very beneficial for the pharmaceutical industry in Thailand as it will help enhance the innovation performance of the industry. It can also help some pharmaceutical firms to enhance the relationship between knowledge management practices and the business model innovation and provides crucial opportunities for future researchers to manifest the significance of network collaboration practices. However, the study had some limitations because only four variables were used in the research to analyze the innovation business model. Another limitation was that this study only focused on the pharmaceutical industry of Thailand. Therefore, it is recommended to undertake further study in other industries in Thailand and apply more numbers for variable in such future studies.

Conflict of Interest

The authors declare that there is no conflict of interest.

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